CLAIMS

1. A composite substrate of a fluid ejection device comprising:

first and second opposed planar surfaces;

a patterned etch mask formed adjacent to and between the opposed planar surfaces; and

a fluid channel fluidically coupling the first and second opposed planar surfaces through a hole in the first and second opposed planar surfaces and an opening in the patterned etch mask, such that fluid is capable of flowing from the second planar surface through the fluid channel to the first planar surface.

2. The composite substrate of claim 1 wherein the substrate includes silicon adjacent to the first and second planar surfaces, and the patterned etch mask includes oxide located in between the silicon.

3. The composite substrate of claim 1 further comprising:

a plurality of thin film layers disposed over the first planar surface, the thin film layers including a fluid ejection element;

4. The composite substrate of claim 3 wherein said fluid ejection element is a heater resistor.

5. The composite substrate of claim 3 wherein said fluid ejection element is a piezoelectric actuator.

6. The composite substrate of claim 3 wherein said fluid ejection element is an electrostatic actuator.

7. The composite substrate of claim 3 wherein said fluid ejection element resides over the fluid channel.

8. The composite substrate of claim 3 wherein the patterned etch mask forms particle trapping features.

9. The composite substrate of claim 8 wherein the particle trapping features include at least one of screen and mesh.

10. A method of fabricating a fluid ejection device comprising:

bonding a top surface of a first substrate to a bottom surface of a second substrate, wherein a patterned etch mask layer is formed on at least one of the top surface of the first substrate and the bottom surface of the second substrate; and

etching a fluid channel in the first and second substrates extending through an opening in the patterned etch mask layer.

11. The method of claim 10 further comprising thermally growing oxide on at least one of the top surface of the first substrate and the bottom surface of the second substrate to form the patterned etch mask.

12. The method of claim 10 further comprising heating the bonded substrates to thermally anneal them.

13. The method of claim 10 further comprising thinning the bonded substrates.

14. The method of claim 10 wherein the first and second substrates have different crystallographic orientations.

15. The method of claim 10 wherein the fluid channel is formed using a dry etch.

16. The method of claim 10 wherein the fluid channel is formed using a wet etch.

17. The method of claim 10 wherein the fluid channel is formed using dry and wet etching.

18. A method of fabricating a fluid channel for a fluid ejection device comprising:

bonding a top surface of a first substrate to a bottom surface of a second substrate, wherein the top surface of the first substrate has a feed trench;

etching a feed hole from a top surface of the second substrate to the top surface of the first substrate; and

removing a remaining portion of the first substrate to form a fluid channel through the substrates.

19. The method of claim 18 further comprising aligning the first and second substrates prior to bonding.

20. The method of claim 18 further comprising heating the bonded substrates to thermally anneal them.

21. The method of claim 18 further comprising thinning the bonded substrate.

22. The method of claim 18 wherein the first and second substrates have different crystallographic orientations.

23. The method of claim 18 wherein the feed trench and feed hole are formed using a dry etch.

24. The method of claim 18 wherein the feed trench and feed hole are formed using a wet etch.

25. The method of claim 18 wherein the feed trench and feed hole are formed using dry and wet etching.

26. The method of Claim 18 further comprising removing an intermediate layer disposed between the first and second substrates to fluidically couple the top surface of the second substrate to the bottom surface of the first substrate.

27. A method of bonding two semiconductor substrates to form a printhead comprising:

aligning a top surface of a first substrate with a second substrate, wherein the first substrate has a fluid channel in the top surface;

heating first and second substrates to a first temperature in a partial vacuum; and

placing the top surface of the first substrate in contact with the second substrate to form a bond.

28. The method of claim 27 further comprising heating the bonded substrates to a second temperature to thermally anneal.

29. The method of Claim 27 wherein the bond is a silicon to silicon bond.

30. The method of Claim 27 wherein the bond is a silicon to silicon dioxide bond.

31. The method of Claim 27 wherein the bond is a silicon dioxide to silicon dioxide bond.

32. The method of Claim 27 wherein the bond is a silicon to silicon nitride bond.

33. A method of bonding two semiconductor substrates to form a print head comprising:

providing a first substrat with top and bottom opposed planar surfaces with a patterned mask layer on the top planar surface;

providing a second substrate with top and bottom opposed planar surface;

aligning the top surface of the first substrate with the second substrate;

heating the first and second substrates to a first temperature in a partial vacuum; and

placing the top surface of the first substrate in contact with the second substrate to form a bond.

34. The method of claim 33 further comprising:

heating the bonded substrates to a second temperature to thermally anneal them.

35. The method of Claim 33 wherein the bond is a silicon to silicon dioxide bond.

36. The method of Claim 33 wherein the bond is a silicon dioxide to silicon dioxide bond.

37. The method of Claim 33 wherein the bond is a silicon to silicon nitride bond.

38. The method of Claim 33 wherein the bond is a silicon to silicon bond.